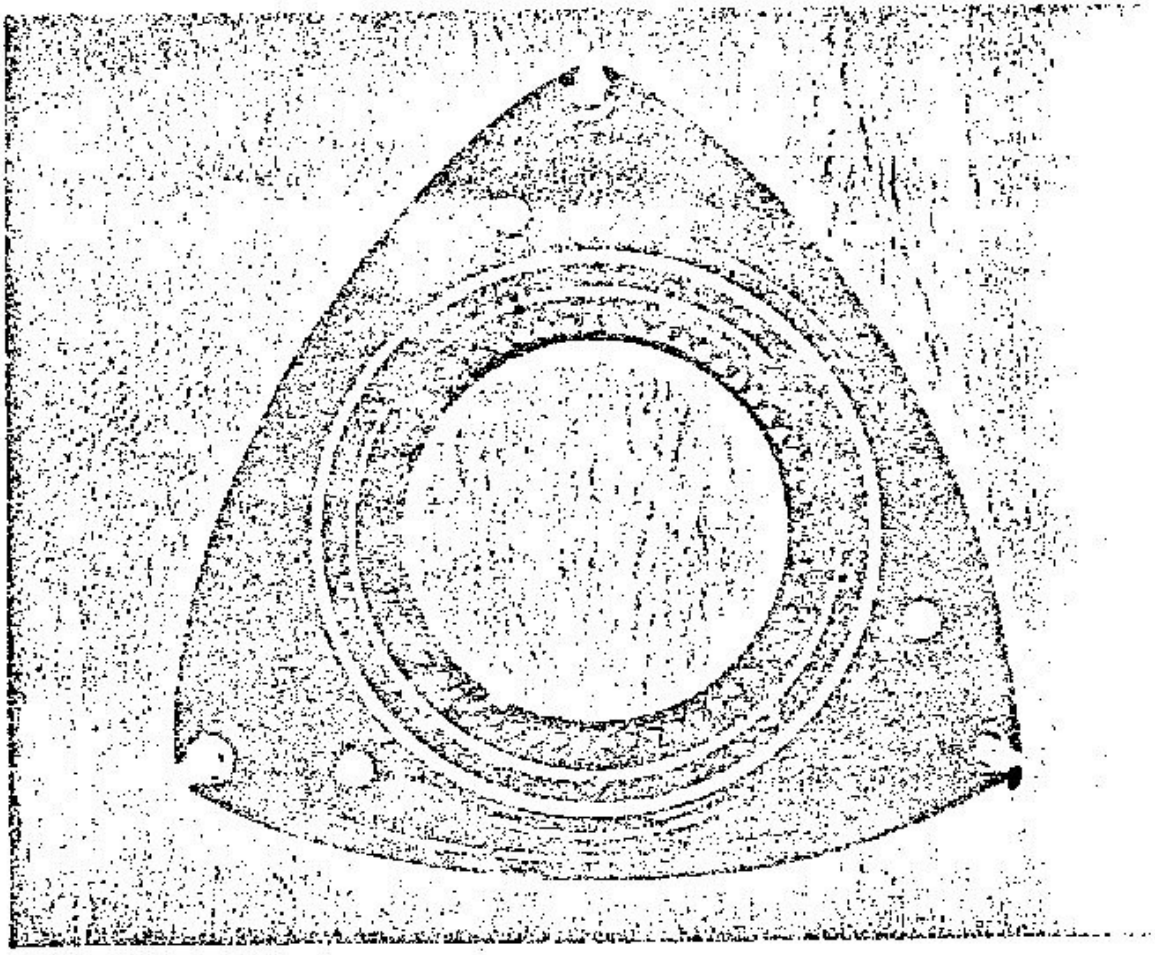
ROTARY ENGINE
SERVICE MANUAL



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FOREWORD

This service manual is intended for those who completed the SUZUKI training course designed to aquaint serviceman with the construction and operating principles of the SUZUKI rotary engine, and provides the disassembly, re-assembly and servicing procedures.

The procedures are set forth in the sequence which standardly prevails in the service shop, and include the methods of checking and inspecting the engine parts. In short, all the information necessary for overhauling the rotary engine is contained in this manual.

The subject matter of this manual is the SUZUKI rotary engine unit complete with counterweights. Though the engine is a major component of the motorcycle, the know-how of overhauling it alone is not enough: its relation with the other components must be fully understood by those who are to service SUZUKI motorcycles of this new line. For this reason, the reader is advised to refer to the following SUZUKI publications:

SUZUKI RE5 Service Manual	Covering the overhaul of all the other components than the rotary engine unit of the RE5 motorcycle.
Parts Catalog	A reference carrying part numbers and nomenclatures and other data.
Owner's Manual	Covering information as to the techniques of operating the various controls, plus basic maintenance.

In the text of this manual, such terms as "right", "left", "top" and "bottom" are used in the sense of the rider's view, except where the terms are otherwise qualified explicitly.

For convenience of those servicemen in countries where the English system of measure is used, dimensional values are indicated in parentheses ( ) to denote that the values are in inches.

SUZUKI MOTOR CO., LTD.

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I. GENERAL INFORMATION

1. DESCRIPTION

The Wankel type rotary engine mounted on the SUZUKI RE5 motorcycle delivers 62 HP at 6,000 rpm, with its 497 cc (30.3 cu. in.) total displacement and 9.4 : 1 compression ratio. Maximum torque is 7.6 kg-m (54.9 ft-lb) at 3,500 rpm.

The SUZUKI RE5 rotary engine, as contrasted to a general reciprocating type of engine, consists essentially of a rotor housing (comparable to the cylinder head), a rotor (comparable to the piston), two side housings (comparable to the cylinder block), an eccentric shaft (comparable to the crankshaft) and two counterweights for static and dynamic balance.

The rotor housing and side housings are an aluminum alloy in material. This material exhibits but a small coefficient of thermal expansion. The inner surface or bore wall of the rotor housing, curved to present a trochoidal profile, is covered with an overlay of a composite electro-chemical material—nickel containing fine particles of silicon carbide. The overlay constitutes an extremely wear-resistant and resilient surface layer. Those surfaces of the side housings forming a sealed running clearance at each end face of the rotor have a surface layer of molybdenum deposited by spraying. This metal overlay meets the tringent abrasion-resistant requirement imposed on the surfaces.

2. SPECIFICATIONS

Type		NSU-Wankel type rotary piston engine
Capacity (displacement)		497 cc (30.3 cu.in.)
Corrected compression ratio		9.4
Maximum horsepower (SAE net)		62 HP at 6,500 rpm
Maximum torque		7.6 kg-m (55 ft-lb) at 3,500 rpm
Port timing		
Intake	— Open	Primary: 52° B.T.D.C. Secondary: 111°
	— Close	Primary: 53° A.B.D.C. Secondary: 44°
Exhaust	— Open	77° B.B.D.C.
	— Close	47° A.T.D.C.
Ignition timing		10° at 1,200 rpm, B.T.D.C.
Number of gear teeth:		
Internal gear		57
Stationary gear		38
Spark plug		A9EFV (NGK)

3. SPECIAL TOOLS

No.	Part Number	Description	Use
1.	09910-03710	Rotary engine overhaul stand	For holding the engine being disassembled or re-assembled.
2.	09915-01710	Counterweight restrainer	For locking the counterweight.
3.	09900-05801	Power wrench	For driving counterweight nut.
4.	09912-03710	Housing and counterweight puller	
5.	09911-63710	Dowel pin puller	
6.	09912-63710	Seal ring handle set	
	09912-63720	Seal ring handler No. 1	For eccentric shaft seal ring.
	09912-63730	Seal ring handler No. 2	For oil baffle disc seal ring.
	09912-63740	Seal ring handler No. 3	For eccentric shaft seal ring.
	09912-63750	Seal ring handler No. 4	For oil baffle disc seal ring.
7.	09911-73710	4-mm "T" allen wrench	For removing oil baffle disc.
8.	09911-73730	5-mm "T" allen wrench	For removing internal gear.
9.	09911-73720	4-mm combination allen socket wrench	For use with torque wrench.
10.	09911-73740	5-mm combination allen socket wrench	For use with torque wrench.
11.	09912-73710	Side seal miter	For working side seal to length.
12.	09910-33710	Palette	For holding removed seals.
13.	09912-83710	Corner seal gauge	For checking corner seal wear.
14.	09912-33710	Bearing replacement fixture	For holding replacing tools.
15.	09912-43740	Bearing drift set	
	09912-43710	Drift No. 1	For rotor bearing
	09912-53710	Drift No. 2	For rotor bearing
	09912-43720	Drift No. 3	For eccentric shaft housing bearing
	09912-43730	Drift No. 4	For stationary gear bearing
	09912-53730	Bearing remover	For eccentric shaft housing and stationary gear bearing
16.	09910-23710	41-mm socket wrench	For driving counterweight nut.
17.	09913-53710	Rotor oil seal remover	For removing rotor oil seal.
18.	09915-83710	Engine seal-pellet punch	
19.	09910-03720	Engine test stand	
20.	09915-63710	Compression tester	

4. ME

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4. MEASURING INSTRUMENTS

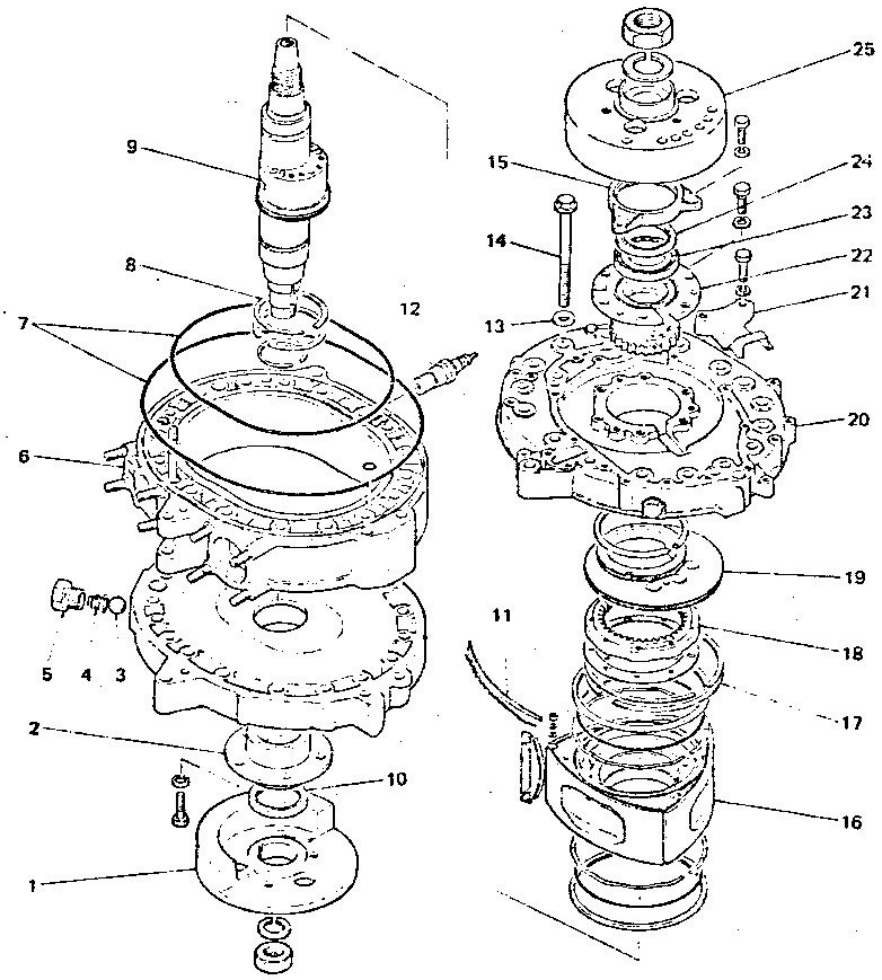
No.	Instrument	Specifications
1	Straightedge	500-mm (19.685 in.)long, within 40 microns.
2	Thickness gauge	From 20 microns up to 100 microns, in increments of 10 microns each.
3	Surface plate	Surface roughness not exceeding 50 microns.
4	Micrometers	(a) 25 ~ 50 mm range (0.984 ~ 1.969 in.) (b) 50 ~ 75 mm range (1.969 ~ 2.952 in.) (c) 75 ~ 100 mm range (2.952 ~ 3.937 in.)
5	Dial gauge	Accurate to 1/1000 mm
6	Dial gauge chuck	(For holding the dial gauge)
7	"V" blocks	100 mm long, 60 mm high; 38 mm deep
8	Cylinder gauges	For 48-mm and 80-mm diameters.
9	Torque wrenches	(a) Calibrated up to 120 kg-cm (b) Calibrated up to 900 kg-cm (c) Calibrated up to 2800 kg-cm
10	Micrometer fixture	(For holding the micrometer)

5. NECESSARY MATERIALS

The following parts are to be replaced at the time of overhauling the rotary engine. Reuse is not permitted. Quantities for one unit of engine are listed here.

No.	Part number	Part	Q'ty	Remarks
1	11100-37810	Rotor housing "O" ring set	1	2 inner "O" rings 2 outer "O" rings 8 oil path "O" rings
2	09168-10015	Side housing gaskets	17	
3	09280-00006	Rotor oil seal "O" ring	2	
4	09284-50002	Bearing retainer oil seal	1	
5	09283-48005	Eccentric shaft oil seal	1	
6	09284-08002	Port valve shaft oil seal	1	
7	09168-06013	Rotor bolt gasket No. 1	3	(To be replaced when
8	09168-05005	Rotor bolt gasket No. 2	6	internal gear is replaced.)

II. DISASSEMBLY



1. Counterweight, right
2. Eccentric shaft housing
3. Check ball
4. Check valve spring
5. Blowby gas pressure regulator plug
6. Rotor housing
7. "O" ring
8. Seal ring
9. Eccentric shaft
10. Oil seal
11. Side seal
12. Spark plug
13. Side housing gasket
14. Side housing bolt
15. Bearing retainer
16. Rotor
17. Seal ring
18. Internal gear
19. Oil baffle disc
20. Left-side housing
21. Oil guide plate
22. Stationary gear
23. Ball bearing
24. Oil seal
25. Counterweight, left

Fig. 1

NOTE: **Before commencing disassembly, clean the surfaces of the rotary engine taken down from the motorcycle, removing road grimes and grease. There may be some cooling water remaining within the engine; let out all the remaining water, if any, by loosening the water drain plug. The plug is located on the bottom side of the right-side housing.**

1. COUNTERWEIGHT REMOVAL

(1) Set the engine on the engine overhaul stand (Tool No. 09910-03710), with the right-side housing coming on bottom side, and secure the engine to the stand by bolting. There are 5 bolts to be run in from the bottom side. Be sure to tighten them good and hard enough to make the engine settle down without any rattle. (Fig. 2)

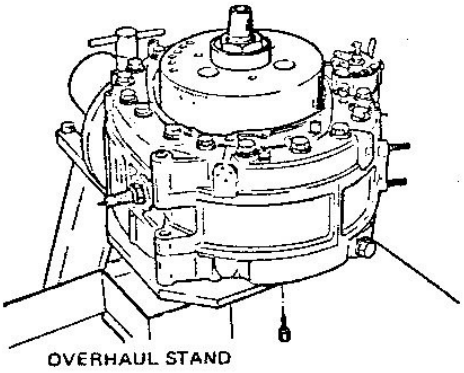


Fig. 2

(2) Using the housing and couterweight puller (Tool No. 09912-93710), remove the right-side counterweight. (Fig. 3)

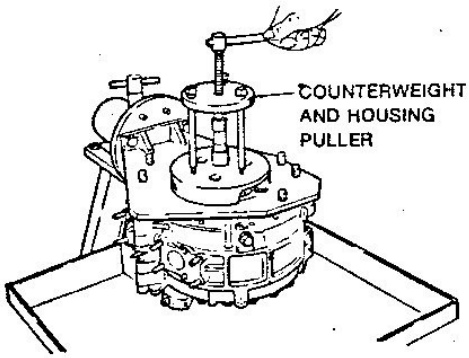


Fig. 3

(3) Loosen the nut securing left-side counterweight. Use the power wrench (Tool No. 09900-05801), counterweight restrainer (Tool No. 09915-13710) and 41-mm socket wrench (Tool No. 09910-23710). (Fig. 4)

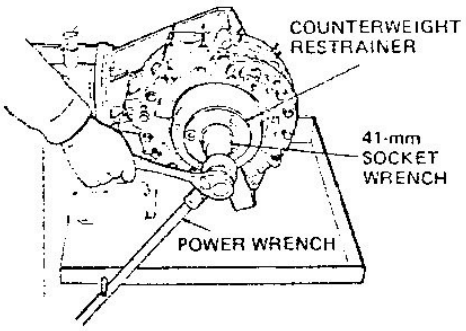


Fig. 4

(4) Draw off the left-side counterweight by using the counterweight puller (Tool No. 09910-23710).

2. REMOVING PORT VALVE LEVER AND CASE

(5) Take a grip on the port valve lever with the pliers, and loosen the nut on port valve shaft. (Fig. 5)

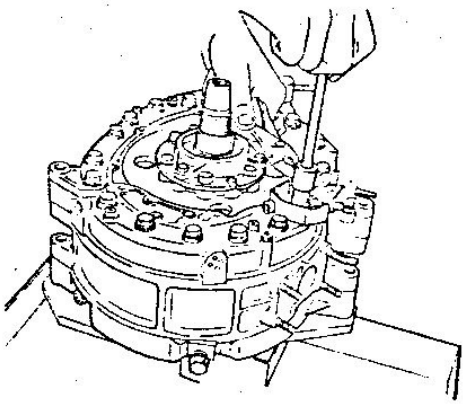


Fig. 5

NOTE: Be careful so that the port valve in place will not scuff or score the bore surface.

(6) Loosen the port valve case bolts and spring stopper screw.

3. LEFT-SIDE HOUSING REMOVAL

(7) Remove the left-side bearing retainer complete with the oil seal. Separate the seal from the retainer.

(8) Ease out the left-side ball bearing. (Fig. 6)

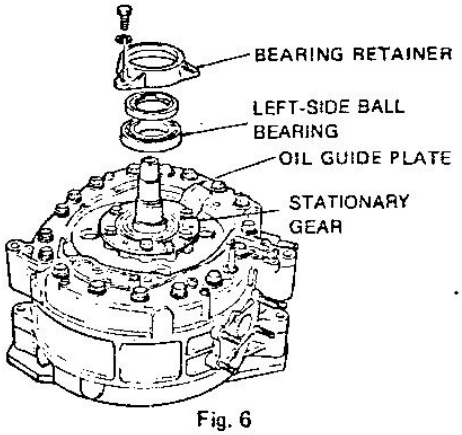


Fig. 6

(9) Loosen the bolts securing the stationary gear to the housing, but leave the gear in place.

(10) Loosen the bolts securing the housing to the rotor housing sequentially, moving the wrench from one bolt to another in the desending order of the numerals cast out on the left-side housing.

(11) Remove the housing bolts, and separate the gasket from each bolt.

(12) Detach and take off the left-side housing. This removal is to be carried out with the use of the housing and counterweight puller (Tool No. 09912-93710). (Fig. 7)

NOTE: As the housing comes off the rotor housing, some of the corner seals might come out stuck to the housing being removed. If this should occur, be sure to examine each seal closely in order to identify the rotor apex from which it came off. Place the seals in the designated positions on the palette (Tool No. 09910-33710). (Fig. 11)

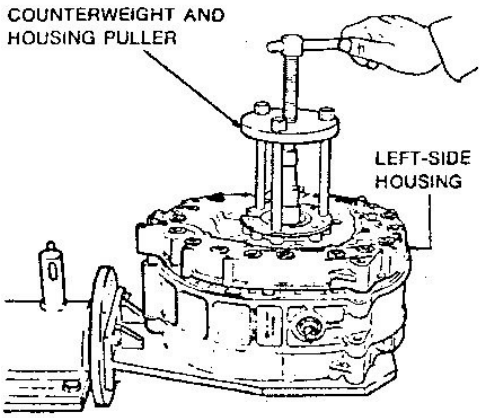


Fig. 7

(13) Remove the stationary gear from the housing. (Fig. 8)

(14) The port valve shaft oil seal is in the housing at this time. Ease out the seal from the housing. (Fig. 8)

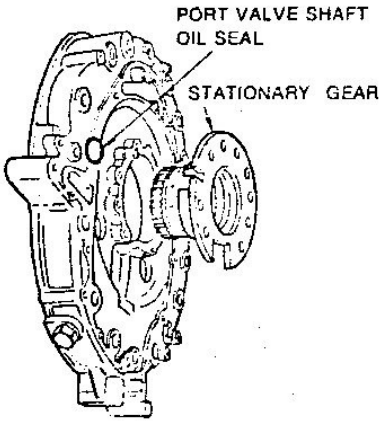


Fig. 8

4. ROTOR HOUSING REMOVAL

(15) Using the dowel pin puller (Tool No. 09911-63710), extract the dowel pins from the rotor housing. (Fig. 9)

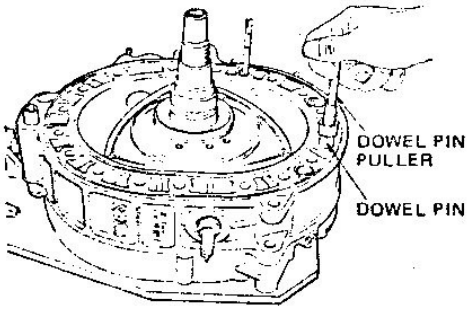


Fig. 9

(16) Pull out the rotor housing. (Fig. 10)

NOTE: This housing has sharp edges at the trochoidal bore. Do not touch these edges with bare hands. Be careful not to nick the edges.

(17) Remove the "O" rings located on the mating faces of the rotor housing. These rings are indicated by arrow marks in the illustration. (Fig. 10)

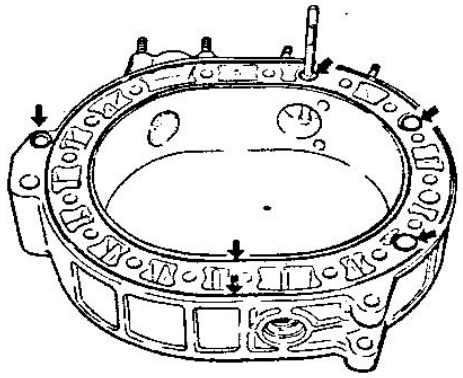
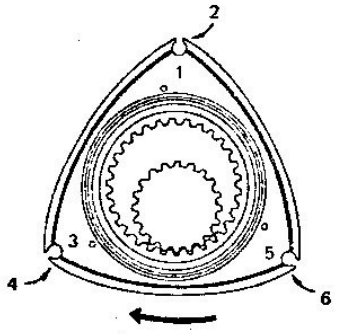


Fig. 10

5. DISASSEMBLING ROTOR AND ECCENTRIC SHAFT

(18) The rotor has apex identification marks stamped on it for discrimination of sealing parts—corner seals, side seals, apex seals, backing springs, etc. Marks are "1", "3" and "5" on one side and "2", "4" and "6" on the other side. Place these sealing parts neatly on the palette (Tool No. 09910-33710), segregating them according to the identification marks. (Fig. 11)

(19) Draw out the rotor, complete with the eccentric shaft, from the right-side housing; remove the sealing parts on the other side; and place them on the palette as outlined above. (Fig. 11)



ROTOR DIRECTION

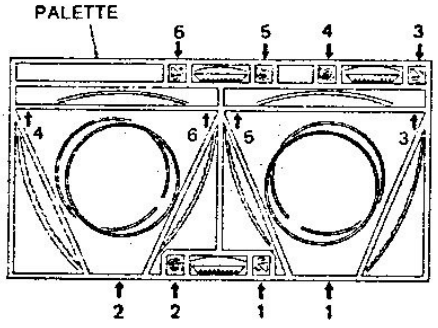


Fig. 11

(20) Loosen the bolts securing the oil baffle disc. Draw out the eccentric shaft from the right side of the rotor. (Fig. 12)

(21) Insert your hand into the bore, now vacated by the eccentric shaft, and push the oil baffle disc from inside to detach it from the rotor. (Fig. 12)

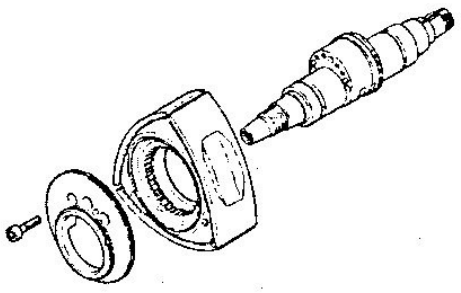


Fig. 12

6. DISASSEMBLING RIGHT-SIDE HOUSING

(22) Using the oil seal remover (Tool No. 09913-53710), remove the oil seal from the rotor. From the removed oil seal, take out the "O" ring inside. (Fig. 13)

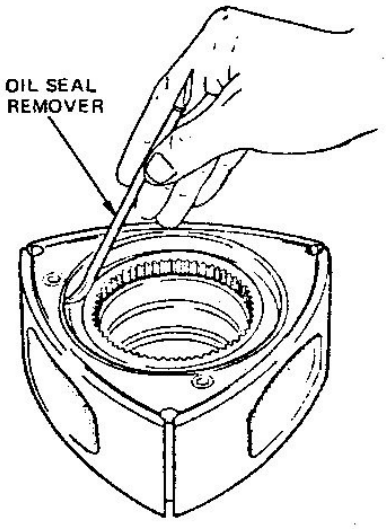


Fig. 13

(23) Loosen the bolts securing the right-side eccentric housing to the right-side housing, and draw out the eccentric housing. (Fig. 14)

(24) Remove the oil seal in the right-side eccentric housing just removed. (Fig. 14)

(25) Remove the blowby gas pressure regulater plug, and take out the spring and ball. (Fig. 14)

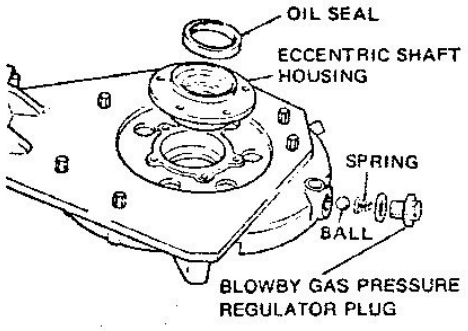


Fig. 14

III. INSPECTION AND REPAIR

1. SIDE HOUSINGS

1-1. Preliminary inspection and cleaning

Visually examine the as-removed side housings for signs of combustion gas and water leakages. Conditions noted at this time on the surfaces of the as-removed housings can often be valuable clues to intense analysis and diagnosis. After this visual inspection, clean the side housings, as follows:

Decarbon the housing surfaces: apply the ketone solvent with a sable brush to the carboned surface to soak the carbon with this solvent and then remove the carbon by wiping or otherwise.

CAUTION: Never use a sharp-edged tool to remove the carbon.

If any burrs are found on the housing, remove them by grinding with a fine-grain oil stone.

1-2. Distortion check

Using the straightedge and thickness gauge as shown, check each housing for surface warpage, by taking readings at each of the four straightedge positions indicated as 1, 2, 3 and 4. (Figs. 15 and 16)

Replace the housing if the maximum reading at any position exceeds the limit:

Distortion limit	0.04 mm (0.0016 in.)

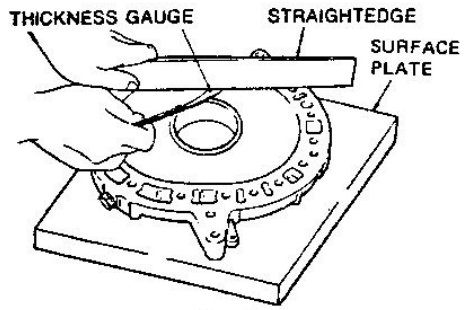


Fig. 15

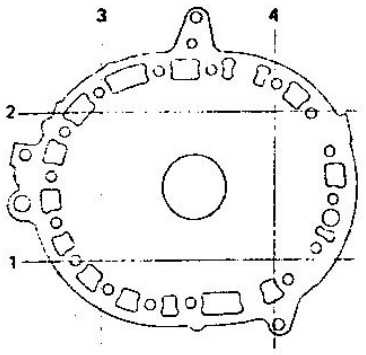


Fig. 16

1-3. Wear check

Rig up the dial gauge as shown, and gently swing the gauge to describe an arc on the sliding surface of the housing with the gauge spindle. Start the arc from the intersection of minor axis and trochoidal contour at the spark plug. Shift the magnetic base of the gauge to the diametrally opposite location, and make another arc. (Fig. 17)

The purpose of taking dial gauge readings in this manner is to determine the "stepped" or "groovy" wear, if any, **in the area around the spark plug.** If the maximum gauge reading obtained should exceed the wear limit, indicated below. Replace the housing by new one.

Wear limit	0.1 mm (0.0039 in.)

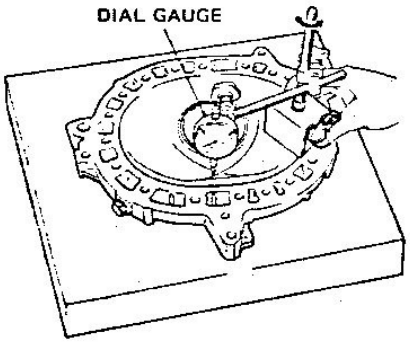


Fig. 17

1-4. Checking the spring in blowby gas pressure regulator

The regulator is a check valve of ball type. Clean the ball and seat plug, removing the carbon by using the ketone solvent in the manner already outlined for the side housings. Visually inspect the cleaned ball and seat to make sure they are smooth, free of any score or dents. (Fig. 18)

Check the spring length in free state; if the measurement taken exceeds the limit, that is, if the spring in free state is found to have shortened to the limit, replace it by a new one.

Free length limit	11 mm (0.43 in.)
Standard length	12 ~ 14 mm (0.47 ~ 0.55 in.)

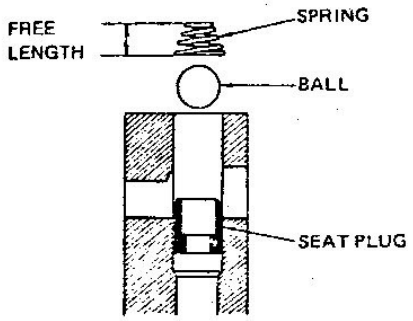


Fig. 18

2. ROTOR HOUSING

2-1. Preliminary inspection and cleaning

Visually inspect the mating faces (mating with the side housings) of the as-removed rotor housing for signs of compression gas and water leakages. Any burrs noted on the edges must be removed by using an oil stone. Then, clean the faces in the manner already described for the side housings.

2-2. Distortion check

Using the straightedge and thickness gauge, check each mating face for warpage. The straightedge is to be laid down at each of the 6 positions indicated. If the maximum gauge reading at any straightedge position exceeds the limit, replace the housing. (Figs. 19 and 20)

Distortion limit	0.04 mm (0.0016 in.)

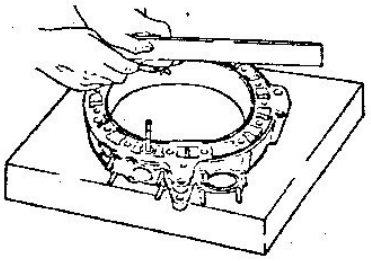


Fig. 19

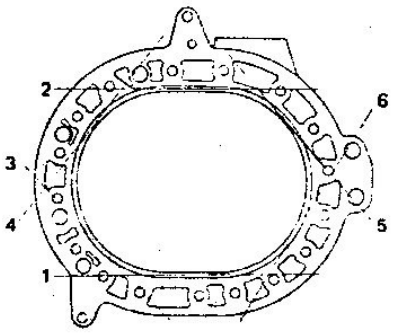


Fig. 20

2-3. Width checking

Check the housing width by miking at four places indicated as A, B, C and D, thus obtaining four readings. (Figs. 21 and 22) If the difference between the largest and the smallest reading of the four exceeds the limit indicated below, replace the housing:

Width variation limit	0.07 mm (0.0028 in.)

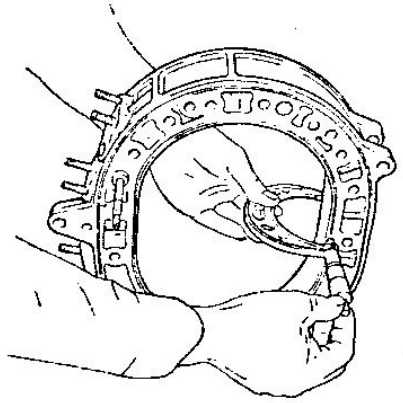


Fig. 21

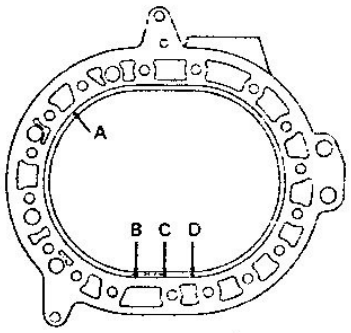


Fig. 22

2-4. Checking the smoothness of port valve shaft movement

The port valve is in place at this stage. Put on the left-side housing to admit the protruding end of this shaft into the bush in the housing. Under this condition, turn the valve shaft by hand a few times to see if it rotates smoothly; if not, disassemble and clean the port valve. If the shaft is found to have too much a rattle, replace the shaft. When assembling the valve, be sure to apply THREAD LOCK CEMENT (No. 99000-32030) to the port valve screws securing the valve to the shaft. (Fig. 23)

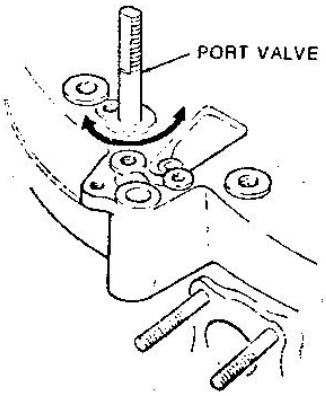


Fig. 23

3. ECCENTRIC SHAFT

3-1. Wear check

Check the eccentric shaft for wear by miking it in two diametral directions 90° apart (criss-cross) at each of the 6 places indicated by arrow marks. These 6 places are in three groups, two at the eccentric portion and two at each of the journal portions of the shaft. (Figs. 24 and 25)

If the smallest reading (of a total of four) at any portion (of the three) exceeds the wear limit, replace the shaft.

Wear at:	Standard diameter	Wear limit
Eccentric portion	79.97 ~ 79.98 mm (3.1484 ~ 3.1488 in.)	79.96 mm (3.1480 in.)
Journal portions (RIGHT and LEFT	47.959 ~ 47.975 mm (1.8882 ~ 1.8888 in.)	47.95 mm (1.8878 in.)

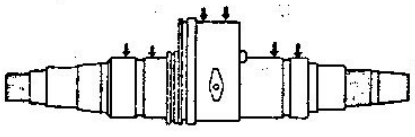


Fig. 24

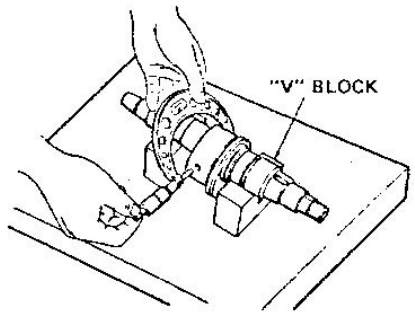


Fig. 25

3-2. Runout check

Rest the shaft on the "V" blocks, supporting the shaft at its journal portions, and rig up the dial gauge, as shown. With the gauge spindle pointed squarely to the outboard part of each straight section of the shaft, turn the shaft to read the radial runout. (Fig. 26)

The eccentric shaft must be replaced if the limit is exceeded at either end:

Radial runout limit	
RIGHT:	0.03 mm (0.0012 in.)
LEFT:	0.015 mm (0.0006 in.)

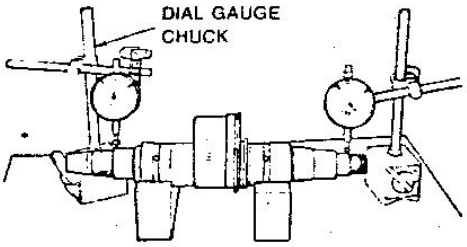


Fig. 26

4. BEARINGS

4-1. Rotor bearing wear check

The wear of this bearing is to be determined by comparing the I.D. readings, taken in the manner illustrated, against the diameter readings taken on the eccentric portion in 3-1. (Figs. 27 and 28)

Check the bearing bore diameter in two criss-cross directions 90 degrees apart, at two places, top and bottom, in the rotor laid down as shown, in each direction to produce four readings. From the largest reading of these four, substract the smallest diameter reading on the eccentric portion. The difference is the maximum oil clearance value. If this value exceeds the limit, replace the bearing in question:

Oil clearance limit	0.12 mm (0.0047 in.)

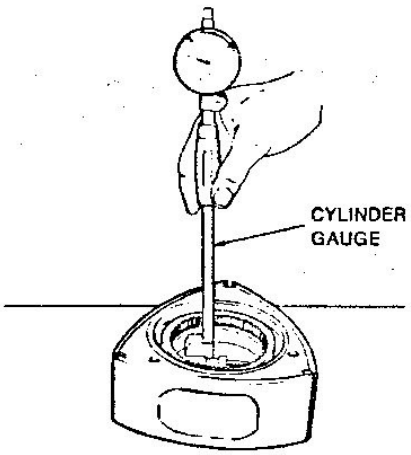


Fig. 27

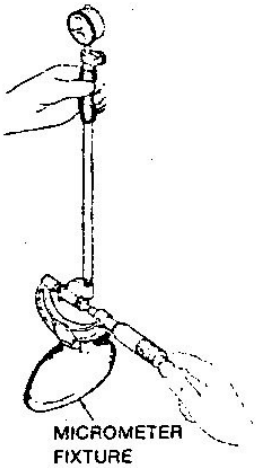


Fig. 28

How to replace the bearing, fitted into the rotor, will be outlined:

(1) Loosen the 9 bolts securing the internal gear to the rotor. The gear is fitted to the right side of the rotor. Use the "T" allen wrench (Tool No. 09911-73710) to drive these bolts.

(2) Mount the rotor on the bearing replacement fixture (Tool No. 09912-53710), with its right side looking up. (Fig. 29)

(3) Fit the drift No. 2 (Tool No. 09912-53710) squarely to the bearing in the rotor, and force the bearing off the rotor in a press. (Fig. 29)

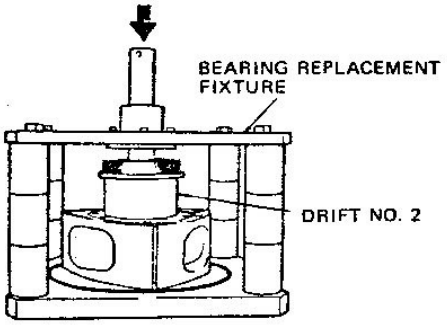


Fig. 29

(4) As a step preparatory to the installation of the replacement bearing, scribe a line on the O.D. surface of bearing. This line is to extend longitudinally from the edge of the locating lug provided in the end face of the bearing. The scribing method is as follows: Place the replacement bearing on the surface plate; put the "V" block against the bearing, centering one edge of the block to the notch; and scribe along the edge. (Fig. 30)

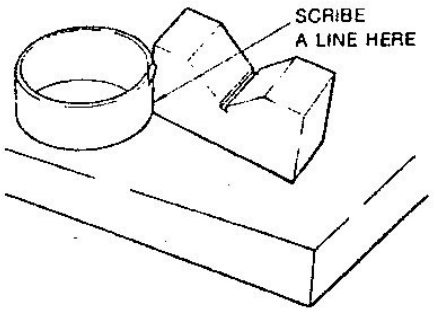


Fig. 30

(5) Turn the rotor upside down, and position the scribed bearing squarely over the bore, with its notched end coming on top side and its scribed line in alighment to the groove provided in the bore. (Fig. 31)

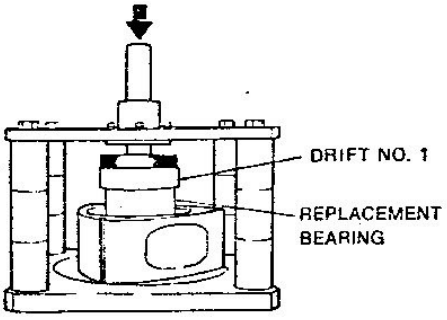


Fig. 31

(6) Fit the drift No. 1 (Tool No. 09912-43710) to the lugged end of the bearing, and force the bearing into the rotor bore by means of the press. Insert the bearing in this manner until the bearing end face becomes flush with the rotor surface there.

(7) Position the internal gear seat as illustrated and insert the locating pins halfway into the holes. Note that the seat has its caved-in side facing the roter. Re-install the internal gear as follows: Position the gear in the rotor, with the two match marks

brought into register (one mark on the gear and the other mark "1" on the rotor), and adjust the bearing so that the three studs of the rotor align to the corresponding holes provided in the gear. With the gear so set, secure it to the rotor by running in the rotor bolts. (Fig. 32)

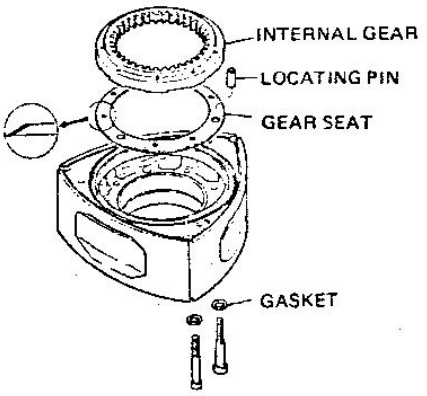


Fig. 32

Be sure to use new gaskets on these bolts, and to tighten the bolts to the following torque value:

Tightening torque	4-thread:	40 kg-cm (2.9 ft-lb)
	5-thread:	70 kg-cm (5.1 ft-lb)

4-2. Journal bearing wear check

The wear of the two journal bearings, one in the stationary gear and one in the eccentric shaft housing, is to be determined in a manner similar to that for the rotor bearing, 4-1.

Take four I.D. readings, up and down and in criss-cross directions, on each bearing; and, from the largest reading of these four, subtract the smallest reading of the four taken on the corresponding journal portion in 3-1. The difference is the maximum oil clearance value. If this value exceeds the limit, replace the bearing:

Oil clearance limit	0.13 mm (0.0051 in.)

The methods of replacing the journal bearings will be described:

Left-Side Journal Bearing:

(1) Insert the bearing remover (Tool No. 09912-53730) into the bore of the stationary gear, and get a firm hitch on the bearing inside, as shown. (Fig. 33)

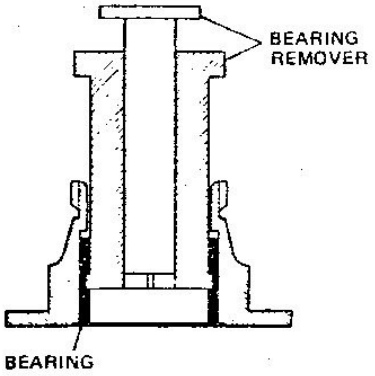


Fig. 33

(2) Place the stationary gear on the bearing replacement fixture (Tool No. 09912-33710), with its gear side coming on top. In a press, give a push to the remover to force the bearing off the stationary gear. (Fig. 34)

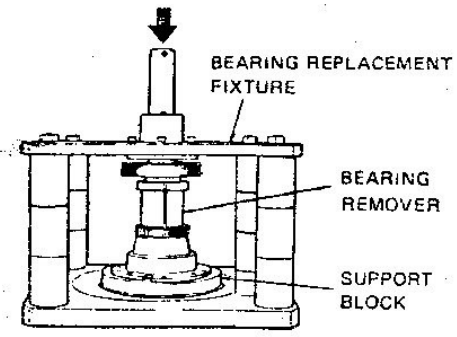


Fig. 34

(3) Scribe on the replacement bearing as in the case of the rotor bearing, 4-1.(4).

(4) Turn the stationary gear upside down. With the drift No.4 (Tool No. 09912-43730) fitted to the bearing, force it into the gear in the press, inserting it until its trailing end becomes flush with the flange face of the gear. (Fig. 35)

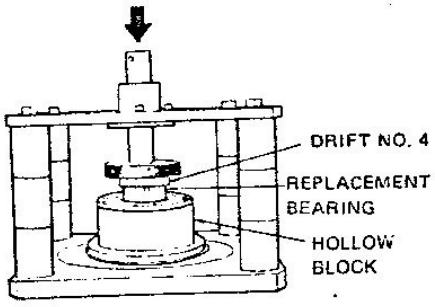


Fig. 35

Right-Side Journal Bearing:

(1) Insert the bearing remover (Tool No. 09912-53730) into the bore of the shaft housing. (Fig. 33)

(2) Place the eccentric shaft housing on the bearing replacement fixture (Tool No. 09912-33710), with its flange face looking down; and, in the press, force the bearing off the housing. (Fig. 36)

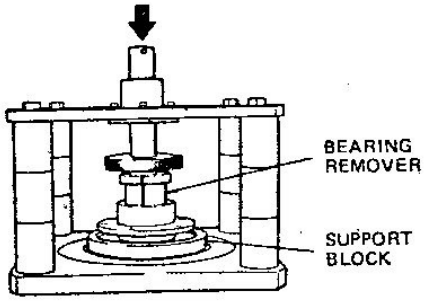


Fig. 36

(3) Scribe on the replacement bearing in a manner similar to the case of the rotor bearing, 4-1. (4).

(4) Stick your fingertip into the bore for the bearing, and feel the chamfered edges of the housing. If any hitch is felt, dull the edge with emery cloth.

(5) Turn the housing upside down, position the scribed bearing on the bore, with its scribed line in line to the groove provided in the housing, and force the bearing into the bore in the press, with the drift No. 3 (Tool No. 09912-43720) used between the bearing and the press arbor. (Fig. 37)

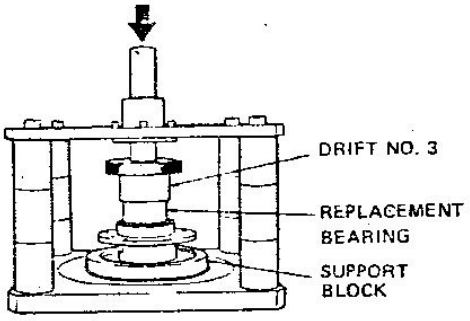


Fig. 37

(6) Insert the bearing until its end face goes in 1 mm beyond the shoulder formed in the bore, as illustrated. (Fig. 38)

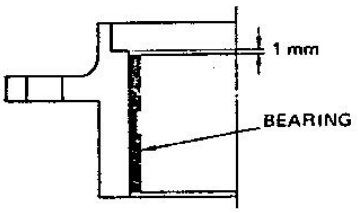


Fig. 38

CAUTION: After inserting the bearing, look into the oil hole and,if any burrs are found, file them off and blow the filingout by using compressed air.

5. ROTOR ASSEMBLY

5-1. Preliminary inspection and cleaning

Visually inspect the as-removed rotor to see if there are signs of combustion gas leakage through other sealed portions than those where a side seal meets a corner seal. Examine the chamber forming faces of the rotor, noting their carboned condition and surface color. What are observed in these inspections give clues for judging how the engine has been burning the fuel-air mixture.

Speaking generally, the leading area of the face will be found brownish whereas the trailing will be blackish, if the engine has been working satisfactorily. (Fig. 39)

Having thus inspected the as-removed rotor, clean its seal grooves surfaces with the ketone solvent, as described previously for the side housings, and remove the corner burrs, if any, with an oil stone. Clean the sealing members, too, with the same solvent.

CAUTION: If the carbon on the rotor surface will not come off easily, emery cloth may be used but be careful not to dull the sharp edges of the apex seal grooves.

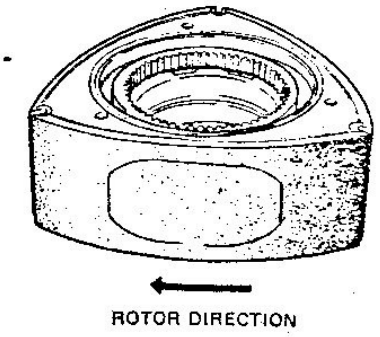


Fig. 39

5-2. Oil seal wear check

The face of the oil seal in rubbing contact with the side housing has a luster. Measure the width of this face. (Fig. 40) If the measurement exceeds the limit, indicated below, replace the seal:

Rubbing width limit	1.2 mm (0.047 in.)
Standard width	0.2 ~ 0.4 mm (0.008 ~ 0.016 in.)

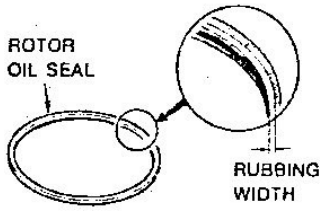


Fig. 40

5-3. Checking the oil seal backing springs

Each backing spring is to be checked for elastic strength in the following manner: Tentatively install the oil seal subassembly, less the "O" ring, in the rotor, and measure the amount with which the oil seal stands proud of the rotor surface. (Fig. 41)

This protrusion depends on the elastic strength retained by the spring, and is specified for proper sealing action. If the protrusion measured is not greater than the limit, replace the spring:

Protrusion limit	0.5 mm (0.020 in.)
Standard protrusion	2.2 mm (0.087 in.)

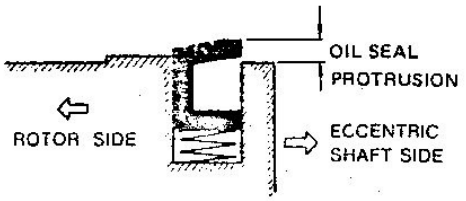


Fig. 41

5-4. Apex seal inspection

The sharp corners formed on the parts of the apex seal sub-assembly are of importance. Examine these corners to be sure they are free of any chips or dullness. Closely inspect the sliding faces of each side piece for uneven wear. (Fig. 42)

The apex seal sub-assembly must be replaced as a whole if any component part of it is found in defective state.

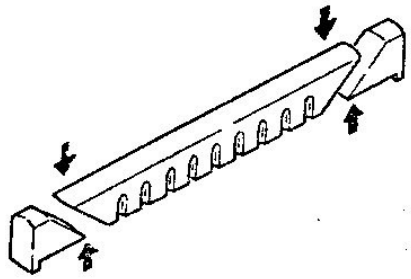


Fig. 42

Check the height of each side piece with the caliper rule. (Fig. 43) If the height measurement on either side piece is not greater than the limit, replace the apex seal sub-assembly as a whole. (Replacing a worn side piece alone is not permitted.)

Height limit	9.0 mm (0.354 in.)
Standard height	9.2 ~ 9.3 mm (0.362 ~ 0.366 in.)

Next, check the overall length of the apex seal sub-assembly as laid out on the surface plate in the manner illustrated, making sure that the side pieces are firmly abutted to the center strip. (Fig. 43) Use a micrometer. If the length checked is found to be less than the minimum width reading taken in step 2-3. **ROTOR HOUSING WIDTH CHECKING**, replace the whole sub-assembly.

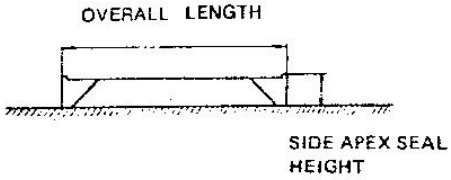


Fig. 43

5-5. Apex seal groove wear check

Insert a new center apex seal into the groove, and check the clearance with a thickness gauge as shown. (Fig. 44) Be sure to insert the gauge foil all the way to the groove bottom. The rotor and counterweights must be replaced as a set if the gauge reading exceeds the limit:

Side clearance limit	0.15 mm (0.0055 in.)
Standard clearance	0.06 ~ 0.09 mm (0.0024 ~ 0.0035 in.)

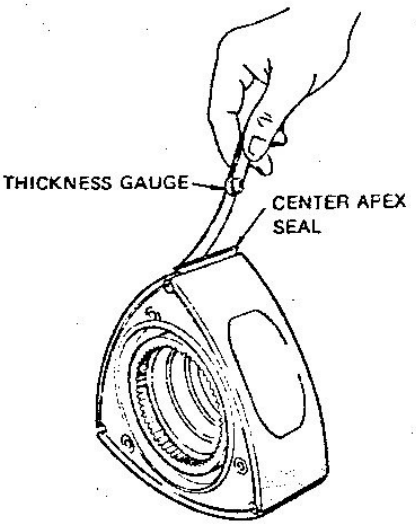


Fig. 44

5-6. Checking the apex seal backing spring for strength

Check each backing spring for elastic strength in the manner illustrated. Note that the spring is laid on the surface plate. Measure the height of the spring. If the measurement is not greater than the limit, replace the spring: (Fig. 45)

Height limit	3.5 mm (0.138 in.)
Standard height	4.5 mm (0.177 in.)

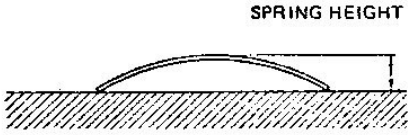


Fig. 45

5-7. Corner seal wear check

Each corner seal must be expected to wear more at its face in contact with the side housing than at its cylindrical surface. Check its length with the caliper rule, and replace it if the caliper reading is less than the limit: (Fig. 46)

Length limit	4.85 mm (0.191 in.)
Standard length	4.9 ~ 5.0 mm (0.193 ~ 0.020 in.)

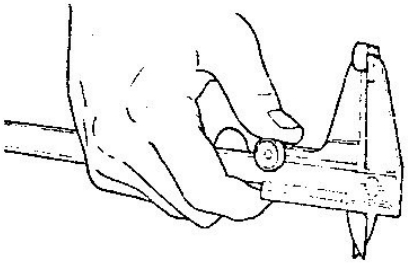


Fig. 46

5-8. Checking the corner seal for wear and its backing springs for strength

Tentatively install the corner seal subassembly, with its apex seal admission slot in perfect register with the apex groove, as shown. Using a rule depth gauge or a short rule, measure the amount of corner seal protrusion. (Fig. 47)

If the measurement taken is not greater than the limit, replace the two springs:

Protrusion limit	0.5 mm (0.020 in.)

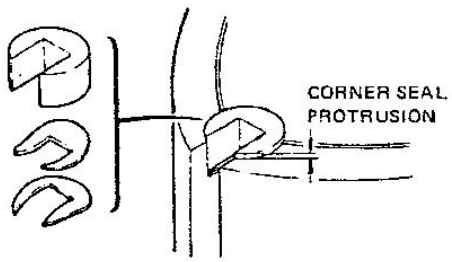


Fig. 47

5-9. Side seal wear check

Each side seal is to be checked for lengthwise wear. The method of checking will be explained for one side seal. Tentatively install the side seal and its adjacent corner seals, as shown, with their backing springs fitted properly. Push the side seal lengthwise to bring its one end into contact with the corner seal, and check the gap at its other end, using a thickness gauge. (Fig. 48)

If the gauge reading taken is greater than the limit, replace the side seal.

NOTE: Replacement side seals are supplied in slightly greater length, so that each replacement seal must be worked on to the length that will provide an end gap falling within the standard range indicated above.

End gap limit	0.1 mm (0.004 in.)
Standard end gap	0.04 ~ 0.06 mm (0.0016 ~ 0.0024 in.)

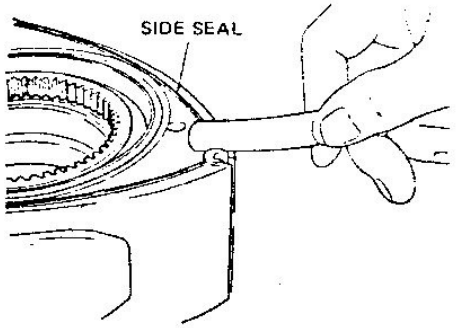


Fig. 48

With the side seal in place, as shown, check its side clearance with the gauge. (Fig. 49) If the measurement taken exceeds the limit, indicated below, the side seal must be replaced:

Side clearance limit	0.10 mm (0.004 in.)
Standard clearance	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in.)

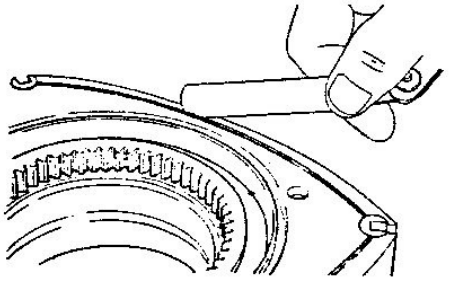


Fig. 49

Check the height of each side seal with the caliper rules. (Fig. 50) If the reading is less than the limit, replace the seal:

Height limit	2.2 mm (0.087 in.)
Standard height	2.3 ~ 2.4 mm (0.091 ~ 0.099 in.)

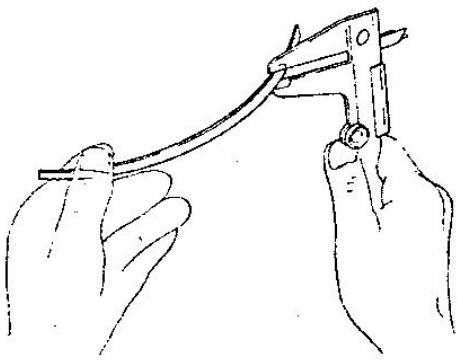


Fig. 50

How to work the replacement side seal to the required length:

The magnitude of power that the engine develops is affected in part by the end gap of the side seal in low-speed range and at cold starting. A proper amount of end gap must be re-introduced in replacing the existing side seal, by working the new seal at its one end to produce the seal length that will bring the gap into the standard range stated above.

The working process is not complicated but demands meticulous attention. Here's how:

(1) Set the replacement seal in the miter (Tool No. 09912-73710), with the seal end showing out just a little. Slide a smooth cut file along the miter face to grind off the protruding end. (Fig. 51)

(2) See if the seal will fit into the groove; if not, grind the end a little more. Repeat the process until the seal fits.

(3) Using a thickness gauge, check the amount of the end gap and determine the extralength of the seal that must be removed in order to obtain a gap of 0.05 mm (0.0020 in.), which is the median value of the standard range.

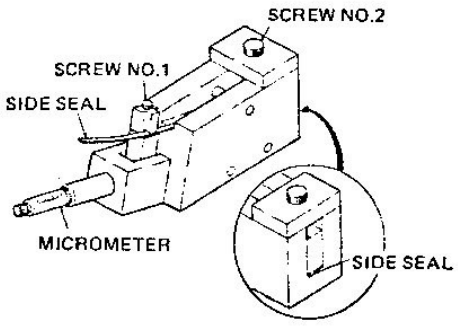


Fig. 51

(4) Position the seal in the miter, with the end face of the seal brought flush with miter face. Tighten screw No. 1 to secure the seal to the micrometer and turn the thimble to advance the seal by the amount determined in step (3) above. (Fig. 51)

(5) Tighten screw No. 2 to secure the seal to the miter and grind off the protrucing portion of the seal with the oil stone. (Fig. 51)

(6) Push the seal against the corner seal, and view the contact through a magnifying glass to be sure that the contact occurs at the middle of the end face, as shown. (Fig. 52)

NOTE: The geometry of contact illustrated is to be realized at both ends.

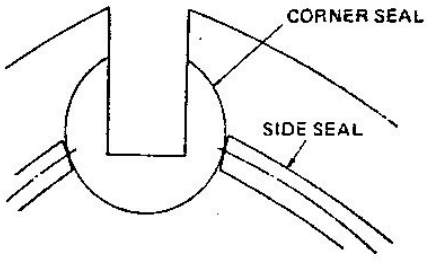


Fig. 52

5-10. Checking the side seal backing spring for strength

As in 5-7, above, tentatively install the side seal sub-assembly and measure the amount of side seal protrusion. (Fig. 53) If the measurement taken is not greater than the limit, replace the backing spring and, if the replacement spring does not result in a satisfactory protrusion, replace the seal too:

Protrusion limit	0.5 mm (0.020 in.)

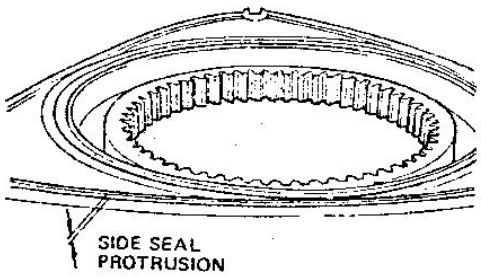


Fig. 53

5-11. Corner seal hole wear check

Use the special no-go gauge (Tool No. 09912-83710) to check each corner seal hole for wear. Try to insert the gauge into the hole, as shown. (Fig. 54) If the gauge enters the hole, it means that the hole has enlarged beyond the wear limit (represented by the gauge itself). In such a case, the rotor and counterweights must be replaced.

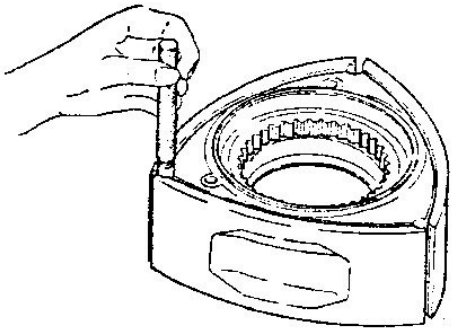


Fig. 54

5-12. Circular land height check

Using the straightedge and thickness gauge, measure the height of the circular land around the oil seal, under the straightedge laid down as shown. A total of six gauge readings are to be taken, three on each side of the rotor. (Figs. 55 and 56) If any of the readings is less than the limit, replace the rotor and counterweights:

Height limit	0.08 mm (0.0031 in.)
Standard height	0.10 ~ 0.21 mm (0.0039 ~ 0.0083 in.)

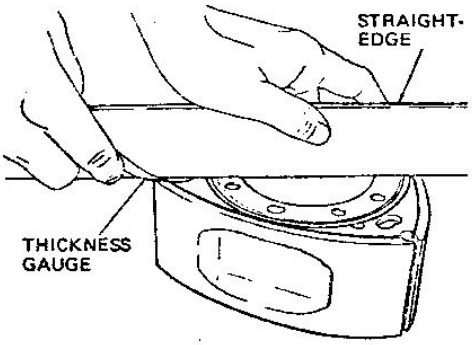


Fig. 55

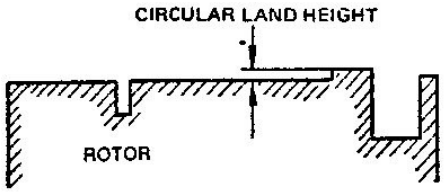


Fig. 56

5-13. Rotor end play check

The term "play" here is used in a theoretical sense, and must not be taken for the actual rotor end play, which cannot be measured directly in a built-up engine.

Place the rotor housing and rotor on the surface plate, lay the straightedge across, and read the clearance between the circular land of the rotor and the straightedge. This clearance is the height of the mating face of the housing above the land. (Figs. 57 and 58)

The measurement is to be taken at each of the four straightedge positions, numbered "1", "2", "3" and "4". If any of the four readings exceeds the limit, the rotor and counterweights must be replaced:

NOTE: The rotor placed on the surface plate, as shown, is stripped of the sealing parts for the chambers—apex seals, corner seals, side seals and all.

"End play" limit	0.26 mm (0.0102 in.)
Standard "end play"	0.134 ~ 0.250 mm (0.0052 ~ 0.0098 in.)

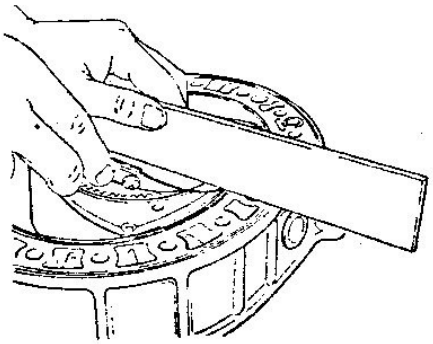


Fig. 57

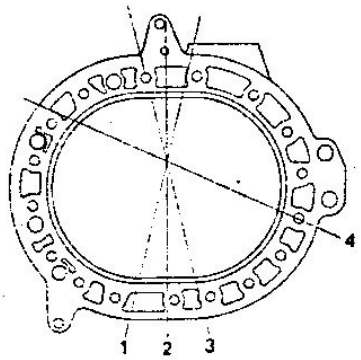


Fig. 58

6. SEAL RINGS

6-1. Seal ring wear check

Check the width of each seal ring with the caliper rule, as shown. Replace the ring if found worn down beyond the wear limit: (Fig. 59)

Seal ring location	Standard width	Wear limit
Rotor side	1.5 mm (0.059 in.)	1.45 mm) (0.057 in.)
Housing side:		
Eccentric shaft	2.5 mm (0.098 in.)	2.45 mm (0.096 in.)
Oil baffle disc	3.0 mm (0.118 in.)	2.95 mm (0.116 in.)

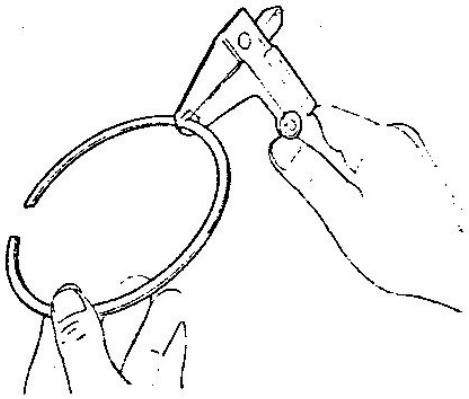


Fig. 59

6-2. Seal ring groove wear check

Using the caliper rule, check the width of each groove for the seal ring. The grooves are in the eccentric shaft and oil baffle disc. These parts must be replaced if their respective seal ring grooves are checked to exceed their width limits: (Fig. 60)

Groove location	Standard width	Width limit
Rotor side	3 mm (0.118 in.)	3.25 mm (0.128 in.)
Housing side:		
Eccentric shaft	2.5 mm (0.098 in.)	2.75 mm (0.108 in.)
Oil baffle disc	3 mm (0.118 in.)	3.25 mm (0.128 in.)

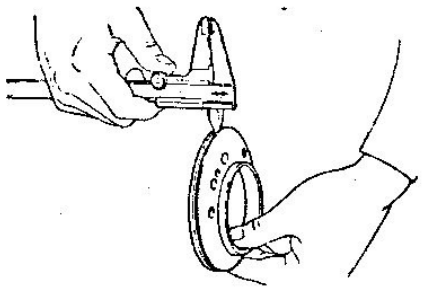


Fig. 60

7. INTERNAL GEAR AND STATIONARY GEAR

Inspect the teeth of the internal and stationary gears for evidence of flaking and excessive or abnormal wear. If the internal gear is found excessively or abnormally wear at its teeth, replace the whole rotor assembly. The stationary gear, however, can be replaced alone. (Fig. 61)

During manufacture, locating holes are made by machining the rotor and internal gear together. For this reason, the two must be treated as a set. Replacing either one will result in a poor mesh between stationary gear and internal gear to develop operating difficulties.

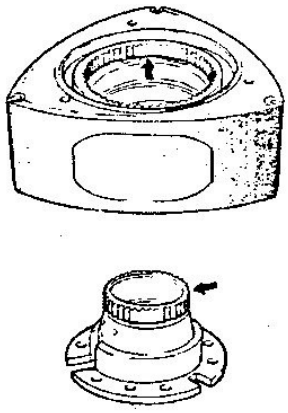


Fig. 61

IV. RE-ASSEMBLY

1. BUILDING THE RIGHT-SIDE HOUSING ASSEMBLY

(1) Install the oil seal in the eccentric shaft housing, by pressing the seal into its position. Be sure to use a new seal.

(2) Bolt the eccentric shaft housing to the right-side housing. Be sure to align the oil holes (one in the shaft housing and the other in the side housing) for the journal bearing. (Fig. 62) Tighten the securing bolts to the following torque value:

Tightening torque	230 kg-cm (17 ft-lb)

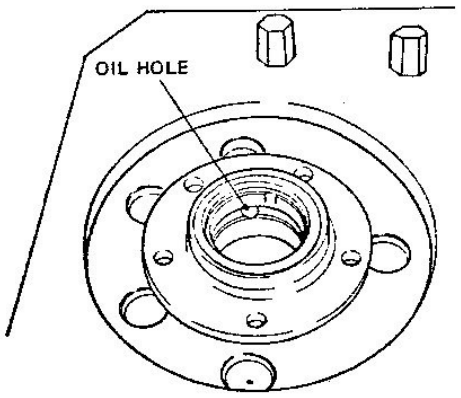


Fig. 62

NOTE: Have the internal surface of the right-side housing lightly oiled. The surface exposed to the rotor is meant here. For the oil, use the rotary engine oil.
Have the internal surface of the journal bearing lightly coated with oil containing molybdenum disulfide (such as MOLYKOTE oil).

(4) Install the ball and spring, and run in the plug to build the blowly gas pressure regulator in the housing. Tighten this plug to:

Tightening torque	250 kg-cm (18 ft-lb)

NOTE: Be sure that the spring loads on the ball by its large-diameter end, as shown. (Fig. 63)

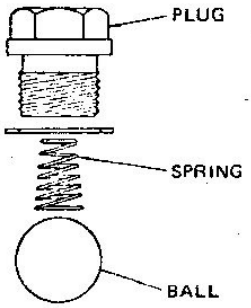


Fig. 63

(5) Fit the water drain plug, and tighten it to:

Tightening torque	250 kg-cm (18 ft-lb)

2. INSTALLING THE ROTOR AND ECCENTRIC SHAFT

(6) Fit the seal rings to the eccentric shaft and oil baffle disc, making sure that the two seal ring halves are matched together as governed by the locating pins and holes provided in these halves. This ring is the one on rotor side. (Fig. 64) ↖ with pin

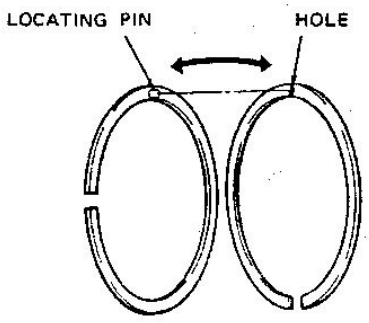


Fig. 64

(7) Place the rotor on the rotor overhaul stand (Tool No. 09910-03720) and insert the eccentric shaft into the rotor while keeping the seal ring contracted by means of the seal ring handler No. 1 (Tool No. 09912-63720). This entry is to be made from the right side of the rotor. The shaft will go in by its own weight to take its position inside. (Fig. 65)

NOTE: Have the sliding surfaces of journal bearing coated with the molydisulfide oil. Apply the rotary engine oil to the seal ring areas.

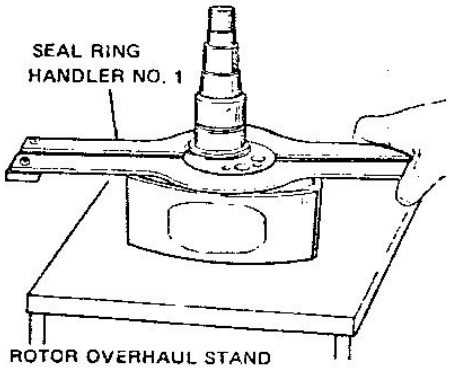


Fig. 65

(8) Feed in the oil baffle disc along the eccentric shaft, bringing it up against the rotor and aligning its holes to the two locating pins of eccentric shaft. Contract the seal ring with the ring handler No. 2 (Tool No. 09912-63730) and settle the baffle disc in place by tapping around its periphery with a plastic mallet. (Fig. 66)

NOTE: Apply the rotary engine oil to the seal ring.

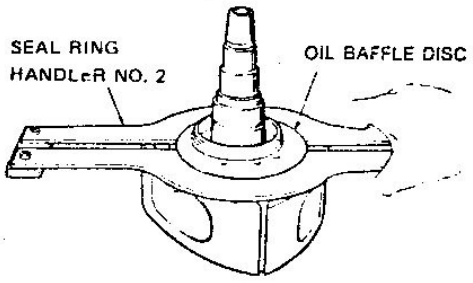


Fig. 66

(9) Tighten the baffle disc securing bolts to:

Tightening torque	100 kg-cm (7.2 ft-lb)

(10) Have the oil seal fitted with a new "O" ring. Install the sealing parts on the right side face of the rotor, identifying each set of sealing parts for its designated position by referring to the stamped marks on the rotor. The seals to be put on the rotor at this time are as illustrated.

NOTE: (a) Have the seal grooves and recesses oiled. Use the rotary engine oil.

(b) Be sure to stack the two springs of each corner seal as shown: they stay back to back (convex to convex). (Fig. 67)

(c) Position each corner seal in such a way that its chamfered end comes on bottom side. (Fig. 67)

(d) The oil seal is tapered on one side, as viwed in cross section. That side comes on top side. (Fig. 67)

(e) Be sure to lay the backing springs for side seals and oil seal in such a way that their wave ends point downward and toward the bottom of the groove. (Fig. 67)

The rotor is assumed to be held level, with its right side facing upward; hence the terms "bottom" and "top".

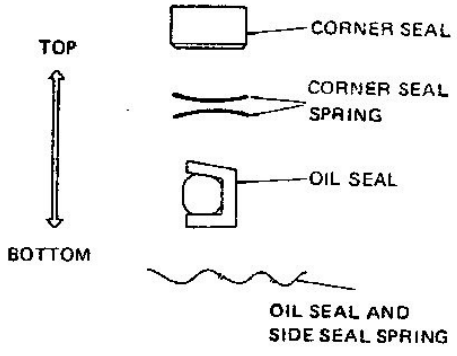


Fig. 67

(11) Having thus built up the rotor and eccentric shaft, apply a small amount of grease to the corner seals so that they will not fall off. Bring the assembly over to the right-side housing on the overhaul stand, and lower it onto the housing, neatly feeding the eccentric shaft into the bore, as shown. Note that the seal ring on the eccentric shaft is contracted with the ring handler No. 3 (Tool No. 09912-63740) during this entry. The rotor will settle down by its own weight on the right-side housing. (Fig. 68)

NOTE: Have the teeth of stationary gear oiled.

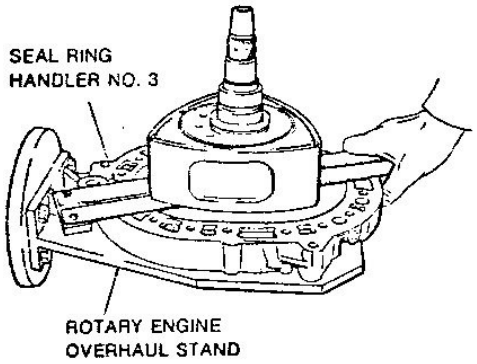


Fig. 68

(12) Turn the rotor and eccentric shaft by hand to bring one of the three apexes right on the minor axis of the trochoidal loop; this is the same thing as turning rotor into T.D.C. position.

(13) At each rotor apex, install the parts of the apex seal sub-assembly. Only the side piece (right) and backing spring go into the groove at this time, from the sub-assembly deposited at the designated location on the palette. Be careful not to pick up the side piece and backing spring from the other sub-assemblies. (Fig. 69)

NOTE: Make sure that the bottom end of the spring is resting on the inside shoulder of the side piece, not on the surface of the side housing under it. Apply grease to the bottom end and middle part of the spring to stay it to the groove, so that it will not interfere the rotor housing being put on in the next step.

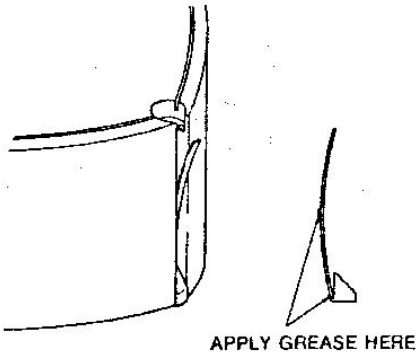


Fig. 69

(14) Having thus partially installed the apex seal sub-assemblies at the three apexes, put on the oilseal, corner seals and side seals in the manner outlined in step (10) above.

3. INSTALLING THE ROTOR HOUSING

(15) Install the "O" rings on both sides of the rotor housing, first by greasing the "O" ring grooves and then fitting the "O" rings to the grooves. Wipe off the excess grease.
Ready the rotor housing for installation by lightly oiling its trochoidal bore surface: use the rotary engine oil.

(16) Carefully lower the rotor housing onto the right-side housing. Exercise utmost caution not to score the trochoidal bore with the apexes of the rotor when the rotor is being lowered.

At this time, the rotor is complete with the gas-containment seals except for the partially installed apex sub-assemblies. (Fig. 70)

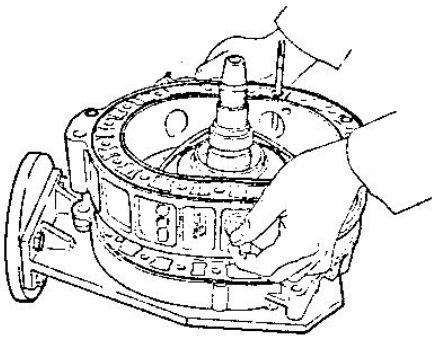


Fig. 70

(17) Adjust the position of the rotor housing on the side housing by inserting the dowel pins.

(18) At each apex, install the center strip and side piece to complete the apex seal sub-assembly in place. Make sure the notched side of the center strip comes on the leading side, that is, on the side facing forward in the direction of rotation. (Fig. 71)

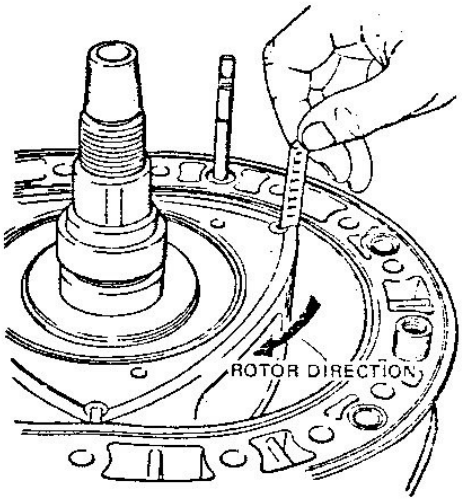


Fig. 71

4. INSTALLING THE LEFT-SIDE HOUSING

(19) Fit the stationary gear to the left-side housing, and place the left-side housing over the rotor housing. Press down the housing while turning the eccentric shaft very, very slowly. To settle the left-side housing, tighten the seal ring on oil baffle disc with the seal ring handler No. 4 (Tool No. 09912-63750) while pressing down the housing. Having thus settled the left-side housing, take off the seal ring handler, and look into the clearance between rotor housing and left-side housing to confirm that the "O" ring in there is snugly in place. (Fig. 72)

NOTE: Before putting on the left-side housing, have its mating face lightly oiled. Use the rotary engine oil.

SEAL RING HANDLER NO. 4

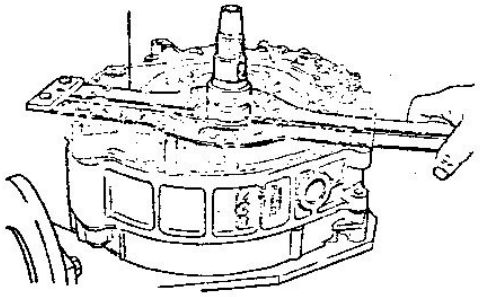


Fig. 72

(20) Fasten down the left-side housing by running in its securing bolts. Tighten the bolts uniformly and sequentially, moving the wrench from one bolt to another in the **ascending order of the numbers cast out on the housing.** These bolts are to be torqued up to: (Fig. 74)

Tightening torque	600 kg-cm (43 ft-lb)

NOTE: **Have the screw threads of each bolt lightly greased at its foremost portion, so that the bolt will loosen off easily at the time of subsequent overhaul. (Fig. 73)**

Be sure to use a new gasket on each bolt for securing the left-side housing.

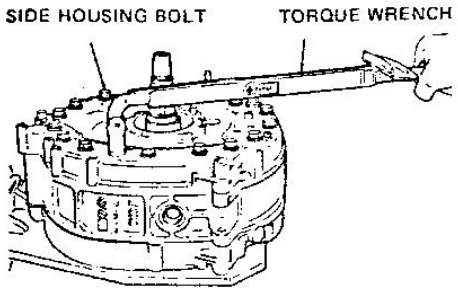


Fig. 73

(21) Secure the stationary gear in place by tightening its bolts to:

Tightening torque	230 kg-cm (17 ft-lb)

(22) Install the ball bearing, and put on the bearing retainer. Tighten the retainer to: (Fig. 74)

Tightening torque	100 kg-cm (7.2 ft-lb)

NOTE: **Use a new oil seal on the bearing retainer.**

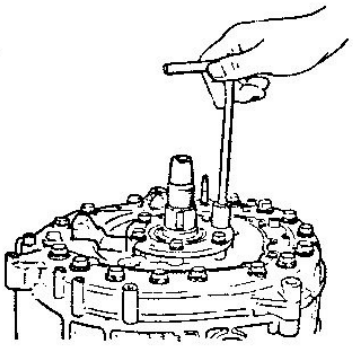


Fig. 74

5. INSTALLING THE PORT VALVE LEVER AND CASE

(23) Give a light coating of grease to the peripheral surface of the oil seal, and fit the seal to the port valve shaft, taking care to position the seal correctly: discriminate its inner side from outer side, as shown. (Fig. 75)

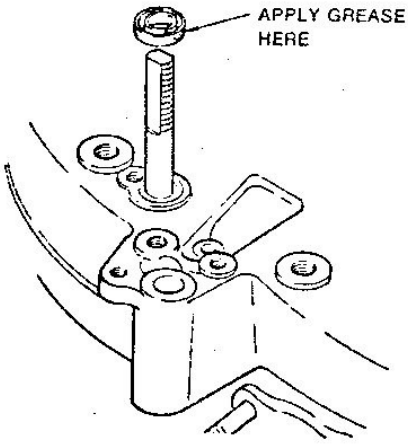


Fig. 75

(24) Install the port valve cover and lever. (Fig. 76)

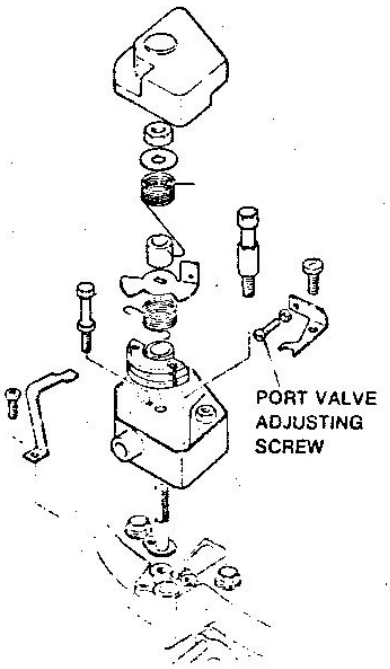


Fig. 76

(25) Position the port valve adjusting screw in place so as to introduce a clearance of 0.1 to 0.15 mm (0.004 ~ 0.006 in.) between port valve and intake port of the rotor housing, as shown. (Figs. 76 and 77)

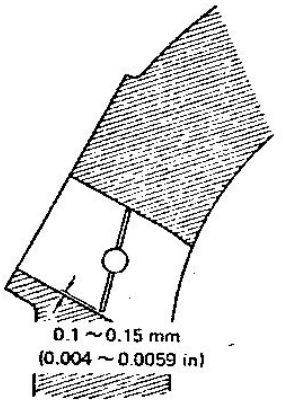


Fig. 77

6. INSTALLING THE COUNTERWEIGHTS

(26) Install the left-side counterweight as follows: Fit the key into the keyway, and feed in the counterweight to its position, and tighten the nut to the torque value, indicated below, by using the couterweight restrainer (Tool No. 09915-13710), 41-mm socket wrench (No. 09910-23710), power wrench (No. 09900-05801) and torque wrench:
(Fig. 78)

Tightening torque	4000 kg-cm (290 ft-lb)

NOTE: The torque wrench operated in combination with the power wrench produces a tightening torque which is 4 times the wrench reading. For example, a 1000 kg-cm torque read means that the actual torque is 4000 kg-cm.

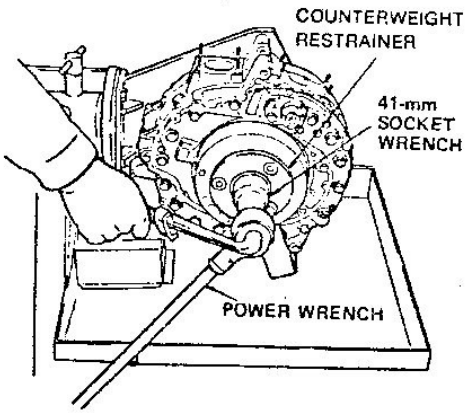


Fig. 78

(27) Install the right-side counterweight. Take down the R.E. unit thus far built on the overhaul stand.

V. SERVICING DATA

1. TIGHTENING TORQUE CHART

Fastening parts	Q'ty	Tightening torque
Rotor bolts (4-mm thread)	6	40 kg-cm (2.9 ft-lb)
Rotor bolts (5-mm thread)	3	70 kg-cm (5.1 ft-lb)
Oil baffle disc bolts	3	100 kg-cm (7.2 ft-lb)
Eccentric housing bolts	5	230 kg-cm (17.0 ft-lb)
Stationary gear bolts	6	230 kg-cm (17.0 ft-lb)
Bearing retainer bolts	3	100 kg-cm (7.2 ft-lb)
Side housing bolts	17	600 kg-cm (43.0 ft-lb)
Right-side counterweight nut	1	2500 kg-cm (180.0 ft-lb)
Left-side counterweight nut	1	4000 kg-cm (290.0 ft-lb)
Blowby gas check valve plug	1	250 kg-cm (18.0 ft-lb)

2. SERVICE LIMITS

A part found to have exceeded its service limit must be discarded (since its service life has ended) and a replacement part must be used in its place.

Part	Item	Service limit
SIDE HOUSING	Distortion	0.05 mm (0.0020 in.)
	Wear	0.10 mm (0.0040 in.)
	Blowby gas check valve spring	11 mm (0.43 in.)
ECCENTRIC SHAFT	Wear (eccentric portion)	79.96 mm (3.1480 in.)
	Wear (journal portion)	47.95 mm (1.8878 in.)
	Runout (right)	0.03 mm (0.0012 in.)
	Runout (left)	0.015 mm (0.0006 in.)
	Seal ring groove width (rotor side)	3.25 mm (0.128 in.)
	Seal ring groove width (housing side)	2.75 mm (0.104 in.)
ROTOR HOUSING	Distortion	0.04 mm (0.0016 in.)
	Width variation	0.07 mm (0.0028 in.)
ROTOR BEARING	Oil clearance	0.12 mm (0.0047 in.)
JOURNAL BEARING	Oil clearance	0.13 mm (0.0051 in.)
ROTOR	Oil seal rubbing width	1.2 mm (0.047 in.)
	Oil seal protrusion	0.5 mm (0.020 in.)
	Apex seal side clearance	0.15 mm (0.0055 in.)
	Side apex seal height	9.0 mm (0.354 in.)
	Apex seal spring height	3.5 mm (0.138 in.)
	Corner seal protrusion	0.5 mm (0.020 in.)
	Corner seal length	4.85 mm (0.191 in.)
	Side seal protrusion	0.5 mm (0.020 in.)
	Side seal height	2.2 mm (0.087 in.)
	Side seal end gap	0.10 mm (0.0040 in.)
	Side seal side clearance	0.10 mm (0.0040 in.)
	Circular land height	0.08 mm (0.0032 in.)
	Rotor end play	0.26 mm (0.0102 in.)
SEAL RINGS	Ring width (rotor side)	1.45 mm (0.059 in.)
	Ring width (housing side)	
	On eccentric shaft	2.45 mm (0.096 in.)
	On oil baffle disc	2.95 mm (0.116 in.)
OIL BAFFLE DISC	Seal ring width (rotor side)	3.25 mm (0.128 in.)
	Seal ring width (housing side)	3.25 mm (0.128 in.)

APPENDIX

— For R/E Rebuilding Shops —

CONTENTS

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1. PURPOSE

This APPENDIX provide R/E rebuilding standards to be adhered to and is intended as the basic guidance for SUZUKI-authorized rebuilding shops. Parts and components to be used in rebuilding a rotary engine must meet quality standards; each rebuilt engine must be checked to ensure that it has been properly assembled and is qualified for release from the shop; and provisions must be made to store rebuilt engines properly so that each can be shipped on demand without requiring any treatment or reworking.

These requirements are hereunder defined:

2. RE-USE LIMIT

Re-use limit is more stringent than service limit. A service limit decides whether the part in question can be re-used in reassembling the engine being **overhauld:** a re-use limit qualifies or disqualifies the part for use in the engine being reassembled as a **rebuilt** engine.

This distinction means that a part to be used in rebuilding (as distinguished from overhauling) an engine must be checked, inspected or tested as described in the section "INSPECTION AND REPAIR" on the main text of this manual and be confirmed to be within the re-use limit stated below.

Part	Item	Re-use limit
SIDE HOUSING	Distortion	0.020 mm (0.0008 in.)
	Wear	0.020 mm (0.0008 in.)
	Blowby gas check valve spring	12 mm (0.47 in.)
ECCENTRIC SHAFT	Wear (eccentric portion)	79.97 mm (3.1484 in.)
	Wear (journal portion)	47.96 mm (1.8882 in.)
	Runout (right)	0.03 mm (0.0012 in.)
	Runout (left)	0.015 mm (0.0006 in.)
	Seal ring groove width (rotor side)	3.05 mm (0.1201 in.)
	Seal ring groove width (housing side)	2.55 mm (0.1004 in.)
ROTOR HOUSING	Distortion	0.020 mm (0.0008 in.)
	Width variation	0.020 mm (0.0008 in.)
ROTOR BEARING	Oil clearance	0.09 mm (0.0035 in.)
JOURNAL BEARING	Oil clearance	0.10 mm (0.0039 in.)
ROTOR	Oil seal rubbing width	0.6 mm (0.024 in.)
	Oil seal protrusion	2.0 mm (0.079 in.)
	Apex seal side clearance	0.09 mm (0.0035 in.)
	Side apex seal height	9.2 mm (0.362 in.)
	Apex seal spring height	4.0 mm (0.157 in.)
	Corner seal protrusion	0.5 mm (0.020 in.)
	Corner seal length	4.9 mm (0.193 in.)
	Side seal protrusion	0.5 mm (0.020 in.)
	Side seal height	2.3 mm (0.091 in.)
	Side seal end gap	0.06 mm (0.0024 in.)
	Side seal side clearance	0.06 mm (0.0024 in.)
	Circular land height	0.10 mm (0.0039 in.)
	Rotor end play	0.25 mm (0.0098 in.)
SEAL RINGS	Ring width (rotor side)	1.5 mm (0.059 in.)
	Ring width (housing side):	
	On eccentric shaft	2.5 mm (0.098 in)
	On oil battle disc	3.0 mm (0.118 in.)
OIL BAFFLE DISC	Seal ring width (rotor side)	3.05 mm (0.1201 in.)
	Seal ring width (housing side)	3.05 mm (0.1201 in.)

3. FINAL INSPECTION ON REBUILT ENGINE

The procedures, which follow, are for the purpose of obtaining vital information on each rebuilt engine before it is transferred to the stock room. In the basis of the information obtained, a judgment can be passed as to whether it has been correctly assembled and whether it will meet the performance and durability standard when it is placed in service.

3-1. Compression Check

(1) Mount the rebuilt R/E on engine test stand (Tool No. 09910-03720). There are 6 bolts to be tightened for securing the engine unit to the stand. Before putting on the engine unit, be sure to clean the seat of the stand and, after putting it on, make sure it seats snugly. (Fig. 1)

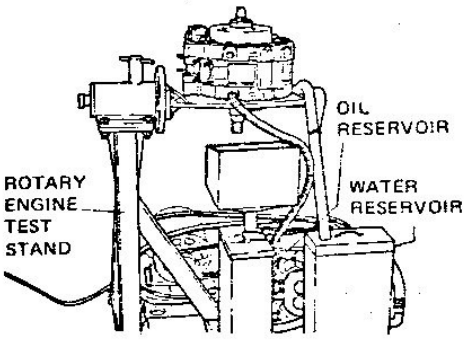

Fig. 1

(2) Make sure that the oil reservoir and water reservoir (parts of the testing equipment) are 80% full. The water should contain the "Golden Cruiser #1200" (an antifreeze compound, which gives a green color to the coolant) so that water leakage, if any, from the unit can be detected more easily.

(3) Mount the "V" belt pulley on that part of the shaft on which the sprocket (primary) and timing gear are normally mounted. This is the right-hand end of the eccentric shaft. Be sure to use lock washer, over which the nut is to be tightened to retain the pulley mounted as shown. (Fig. 2)
Reeve the "V" belt through the groove of the pulley so mounted.

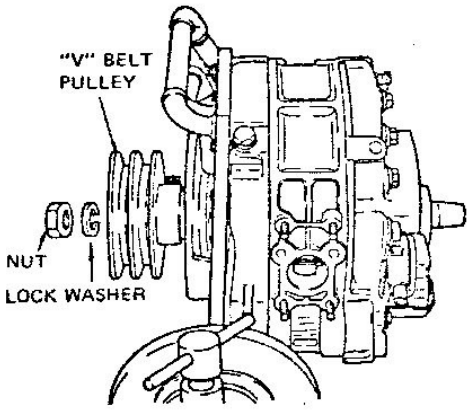

Fig. 2

(4) Install the intake manifold and carburetor in the normal manner.

(5) Tie a vinyl pipe to the exhaust port of the engine unit in order to guide fuel-air mixture to outdoors. Locate the free end of the pipe in such a place as is free from fire hazard. (Fig. 3)

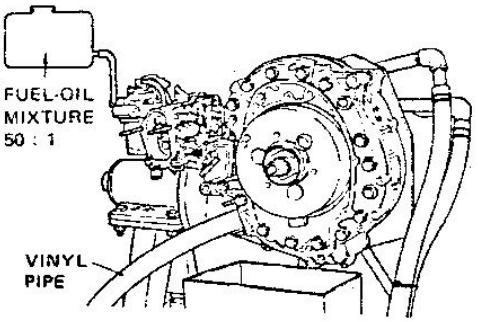

Fig. 3

6) Close the oil inlet of the carburetor. Feed the fuel-oil mixture into the fuel inlet of the carburetor. This mixture is to be prepared with 50 parts of gasoline and 1 part of R/E oil.

7) Have the test stand switch turned off. Plug the three-phase power supply line into the outlet socket on the supply side.

8) In order to remove excess grease (which went into the engine unit during the process of assembly) from inside the rotor housing, turn on the switch to start running the engine. Crank the engine in this manner for five minutes with the primary throttle valve and port valve full-opened. During this period, inspect the various parts of the engine unit for for leakage of oil or water.

9) Remove the spark plug, and screw the compression tester (Tool No. 09915-63710) adapter into the plug hole. Hook up the tester as shown. (Fig. 4)

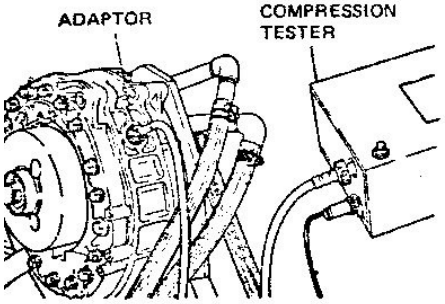

Fig. 4

10) Connect the lead wire of the compression tester to the 12-volt D.C. power source such as a battery. (Fig. 5)

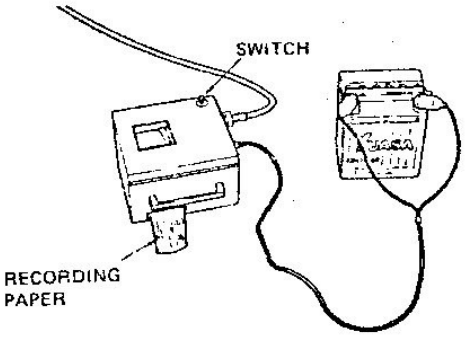

Fig. 5

(11) Turn on the compression tester switch: (Fig. 5)

Wait for the paper to come out of the tester. The paper will come out in about 10 seconds and, when it does, turn on the test stand switch to crank the engine about 10 seconds with the primary throttle valve and port valve full-opened. Using a tachometer, read the rotating speed of the shaft.

Turn off the test stand switch and compression tester switch. Cut off the recorded paper for examination.

3-2. Compression diagnosis

During the 10-seconds cranking, the speed of the eccentric shaft will be anywhere between 300 and 400 rpm. Be sure to read the tachometer accurately, and determine the lowest permissible compression pressure for the speed just read. The graph, below, serves the purpose of determining this pressure. (Fig. 6)

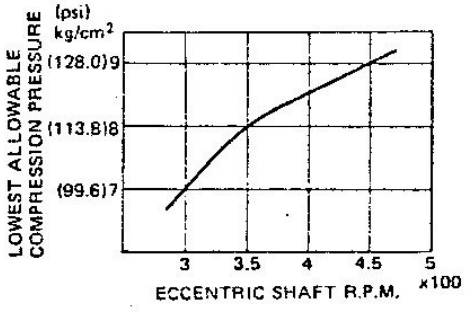

Fig. 6

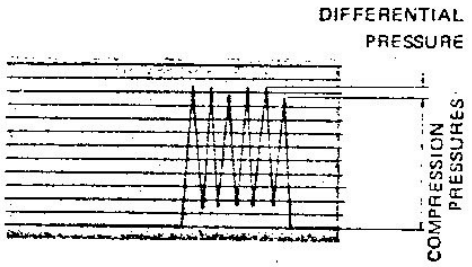

Fig. 7

Three compression pressures are now described on the recording paper. The largest permissible difference between any two pressures if 0.8 kg/cm² (11 psi).

Thus, the rebuilt engine has to meet the two requirement:

1) compression pressure not less than a certain speed-dependent level determinable in the graph and 2) differential pressures not greater than 0.8 kg/cm² (11 psi).

Failure of all three compression pressures to meet the requirement 1) is likely to be due to any of the following malconditions:

1. Side housing bolts are not tightened properly.
2. Rotor housing "O" ring is defective.
3. Leaky pressure line to the compression tester or, more particularly, leaky adapter in the spark plug hole.
4. Poor sealing performance of side apex seal or corner seal for two or all compressions.
5. Defective side seals for all compressions.
6. Excessively distorted side housing or rotor housing.

If one of the three compressions is lower than the other two by 0.8 kg/cm² (11 psi) or more, then the possible causes are:

1. The side seal for that compression is in seized condition.
2. Excessive clearance between side seal and corner seal at the place responsible for that compression.
3. At the place responsible for that compression, the side seal is too thin because of excessive wear or its backing spring is weakened too much.

If two of the three compressions are lower than the third by 0.8 kg/cm (11 psi) or more, the possible causes are the following malconditions existing at the places responsible for those compressions:

1. Poor sealing performance of corner seal
2. Poor sealing performance of apex seal

4. R/E UNIT COMPONENTS FOR SHIPMENT AND STORAGE

4-1. Components of Rebuilt R/E Unit

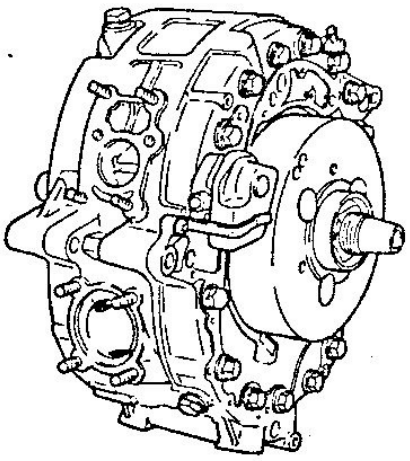

Fig. 8

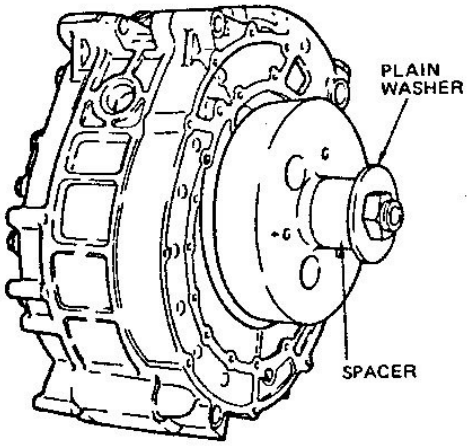

Fig. 9

(1) Not to be included in the rebuilt engine unit are these parts:

- * Dowel pins for the main case.
- * Lock washer for the right-hand couterweight.
- * Primary sprocket and timing gear, and their keys.
- * Intake and exhaust manifolds. Bolts for securing these manifolds are to be left studded in the rotor housing.
- * Spark plug.
- * Dowel pins for left-hand couterweight cover.

(2) The right-hand counterweight, as keyed to the eccentric shaft, is to be in place by fitting spacer (Part No. 09180-35001) and plain washer (09160-25017) in the absence of primary sprocket and timing gear, and by running the nut up against the counterweight, making it just snug-tight.

(3) Be sure to have the left-hand counterweight installed in place. The nut for securing the counterweight should be tightened to the torque value specified for assembly.

(4) Have all the port valve parts, less the cables, installed in place.

(5) Be sure to have the blowby gas check valve plug installed in place.

(6) Be sure to have the water drain plug (on left side housing) installed in place.

4-2. Cacheting and Storing

The cacheting of a rebuilt engine is an explicit declaration of the engine unit being a product meeting the SUZUKI standards for rebuilt R/E units. It must be effected in a dignified manner commensurate to all the quality assurance it implies.

A small hole is provided through the housings at the position for dowel pin; pass a cacheting wire (Part No. 99000-69360) through this hole, as shown, and then thread the wire through the two holes provided in a cacheting pellet (99000-69350). Using the engine seal-pellet punch (Tool No. 09915-83710), flatten the pellet. (Fig. 10)

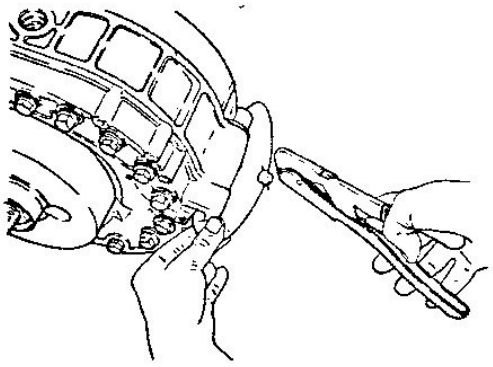

Fig. 10

Wether the rebuilt unit is to be shipped out immediately or to be released to the store room, be sure to close up all openings by taping with the masking tape. The openings to be taped are:

* Intake port and exhaust port (rotor housing).
* Spark plug hole (rotor housing).
* Oil inlet port, water inlet and outlet ports (right side housing).
* Air breathing hole for oil sump.